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United States Patent [19]

Sainton et al.

[11] **Patent Number:** 5,854,985[45] **Date of Patent:** Dec. 29, 1998[54] **ADAPTIVE OMNI-MODAL RADIO APPARATUS AND METHODS**[75] Inventors: **Joseph B. Sainton**, Newburg, Oreg.;
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Eric J. Robinson, Ashburn, both of Va.[73] Assignee: **Spectrum Information Technologies, Inc.**, Purchase, N.Y.

[21] Appl. No.: 707,262

[22] Filed: Sep. 4, 1996

Related U.S. Application Data

[63] Continuation of Ser. No. 167,003, Dec. 15, 1993, abandoned.

[51] Int. Cl.⁶ **H04Q 7/32**[52] U.S. Cl. **455/553; 455/426; 455/557; 455/566**[58] Field of Search 455/33.1, 33.2,
455/33.4, 54.1, 54.2, 56.1, 74, 84, 89, 432,
434, 435, 552, 524, 553, 426, 557; 379/59,
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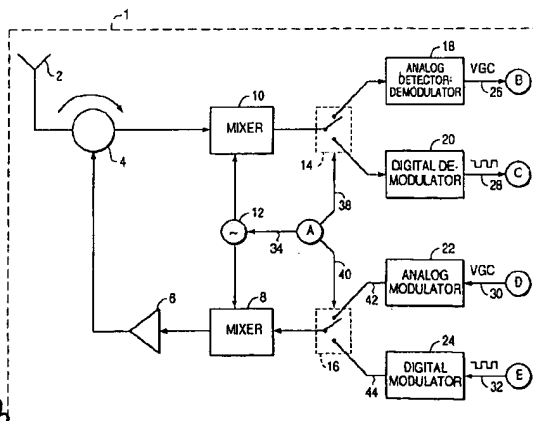
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Primary Examiner—Edward F. Urban*Attorney, Agent, or Firm*—Sixbey, Friedman, Leedom & Ferguson; Charles M. Leedom, Jr.[57] **ABSTRACT**

A frequency and protocol agile wireless communication product, and chipset for forming the same, including a frequency agile transceiver, a digital interface circuit for interconnecting the radio transceiver with external devices, protocol agile operating circuit for operating the radio transceiver in accordance with one of the transmission protocols as determined by a protocol signal and an adaptive control circuit for accessing a selected wireless communication network and for generating the frequency control signal and the protocol control signal in response to a user defined criteria. Among the possible user defined criteria would be (1) the cost of sending a data message, (2) the quality of transmission link (signal strength, interference actual or potential), (3) the potential for being bumped off of the system (is service provider at near full capacity), (4) the security of transmission, (5) any special criteria which the user could variably program into his omni-modal wireless product based on the user's desires or (6) any one or more combinations of the above features that are preprogrammed, changed or overridden by the user. The disclosed invention allows wireless service providers to broadcast electronically as part of any "handshaking" procedure with a omni-modal wireless product information such as (1) rate information and (2) information regarding system operating characteristics such as percent of system capacity in use and/or likelihood of being dropped. The disclosed invention creates a user oriented source enrollment and billing service in the wireless data market by establishing uniform standard for "handshakes" to occur between cell service providers and omni-modal wireless products.

15 Claims, 16 Drawing Sheets

DOCUMENT-IDENTIFIER: US 5854985 A

TITLE: Adaptive omni-modal radio apparatus and methods

BSPR:

Among the known multi-modal proposals is a portable telephone, disclosed in U.S. Pat. No. 5,127,042 to Gillig et al., which is adapted to operate with either a conventional cordless base station or cellular base station. U.S. Pat. No. 5,179,360 to Suzuki discloses a cellular telephone which is capable of switching between either an analog mode of operation or a digital mode of operation. Yet another approach is disclosed in U.S. Pat. No. 4,985,904 to Ogawara directed to an improved method and apparatus for switching from a failed main radio communication system to a backup communication system. Still another proposal is disclosed in U.S. Pat. No. 5,122,795 directed to a paging receiver which is capable of scanning the frequencies of a plurality of radio common carriers to detect the broadcast of a paging message over one of the carriers serving a given geographic region. In U.S. Pat. No. 5,239,701 to Ishii there is disclosed a radio receiver which is responsive to an RF signal containing a plurality of channel frequencies, each having broadcast information, and a circuit for producing a wide band version of the received RF signal and a circuit for producing a narrow band version of the received RF signal.

DEPR:

In addition, a library of command, control and data transmission protocols appropriate for each supported system may be included in circuit 1, and the device can implement the correct protocols by consulting a lookup table during transmissions to obtain the data channel protocols appropriate to the system selected. In another embodiment, the library of command, control, and data transmission protocols may be replaced, or supplemented, by

information
transmitted over the radio frequencies to the device by the
carrier, or
information downloaded from a hardwired connection to another
device. Flash
memory, EEPROMs, or non-volatile RAM can be used to store program
information,
permitting replacement or updating of the operating instructions
used by the
device.